THE BURDEN OF DIABETES IN NEBRASKA

Nebraska Diabetes Prevention and Control Program
Office of Disease Prevention and Health Promotion
Nebraska Health and Human Services System

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EXECUTIVE SUMMARY

Diabetes is a serious disease, requiring extensive medical monitoring and lifelong treatment, and is a common cause of disability and death in Nebraska. The purpose of this report is to quantify the epidemic of diabetes in our state during the past decade. It presents information on the number of people with diabetes, their characteristics, the treatment they receive, and the consequences of the disease. It also describes the risk factors that increase the occurrence of diabetes and its complications. Findings include:

- About 5% of Nebraska adults have diagnosed diabetes, and this figure translates into over 60,000 people. An additional 20,000 people probably have diabetes but have not been diagnosed.
- Diabetes disproportionately affects Nebraska's elderly. About one of every nine people 65 years of age and older have been diagnosed with diabetes, and this age group now comprises over 40% of Nebraska's total population with diabetes. Since most of Nebraska's future population growth is expected to occur among our oldest citizens, the number of people with diabetes will grow substantially.
- Obesity is an important risk factor for diabetes, and more than one in five Nebraska adults is now obese. During the past decade, the percentage of Nebraska adults who are obese has almost doubled.
- Nebraska adults with diabetes are more than twice as likely to be obese and to have high cholesterol, and are more than three times more likely to have hypertension, than are Nebraska adults who do not have diabetes.
- Only about one-third of Nebraska adults with diabetes have ever had a pneumonia vaccination, and over 40% have not had an influenza vaccination within the past year.
- Approximately one of every nine hospitalizations in Nebraska involves a person with diabetes. On average, a diabetes-related hospitalization costs nearly 40% more than a non-diabetes-related hospitalization.
- People with diabetes account for nearly two-thirds of all non-traumatic lower-extremity amputations performed at Nebraska hospitals.
- People with diabetes account for more than two of every five cases of end-stage renal disease diagnosed among Nebraska residents. During the past decade, the annual number of diabetes-related end-stage renal disease diagnoses in Nebraska increased by 164%.
- During the past decade, diabetes was the seventh leading cause of death among Nebraska residents. The state's annual diabetes mortality rate increased by nearly 50% during this period.
- African-Americans, Native Americans, and Hispanics who live in Nebraska are substantially more likely to die from diabetes than are whites.

INTRODUCTION

What is Diabetes?

Diabetes (also called diabetes mellitus or "sugar diabetes") is a disease in which the body does not produce or properly use insulin, a hormone that is needed to convert glucose into energy. Insulin is normally secreted by the pancreas. Glucose can not be sufficiently absorbed into the cells of the body from the bloodstream without insulin.

Diabetes has ranked among the top 10 causes of death in the United States since before World War II, and is now the nation's seventh leading cause of death, directly accounting for approximately 575,000 deaths during the decade of the 1990s. Over the course of the disease, diabetes can lead to a variety of disabling and life-threatening complications, including heart disease, stroke, blindness, kidney failure, nerve damage, and lower-extremity amputation. People with diabetes are also subject to acute complications such as ketoacidosis, which is the result of severe insulin deficiency and can be fatal, while diabetes during pregnancy can have adverse effects on both mother and fetus. All of these conditions contribute to diabetes' staggering cost, which was estimated by the Centers for Disease Control and Prevention (CDC) to be nearly $700 million (including medical care, lost productivity, and premature death) in Nebraska in 1998 alone. Much of the morbidity and mortality that results from diabetes is preventable, however.

Diabetes is diagnosed through identification of elevated blood glucose concentrations. Elevated blood glucose can occur if either insulin secretion or insulin action is impaired. The major forms of diabetes are:

- Type 1 diabetes, sometimes called insulin-dependent diabetes or juvenile-onset diabetes, usually begins in childhood or adolescence, though it can occur at any age. People with this type of diabetes produce little or no insulin, and they require injected insulin for treatment. About 5-10% of all cases of diabetes are classified as Type 1.

- Type 2 diabetes, sometimes called non-insulin-dependent diabetes or adult-onset diabetes, usually develops in adults after the age of 40, and is by far the most common type of diabetes. People with Type 2 diabetes have insulin resistance, which means that they can produce insulin but they can not use it to convert glucose into energy. A person with this type of diabetes may go undiagnosed for years because hyperglycemia (i.e., too much glucose in the blood) can develop gradually without noticeable symptoms. Treatment of Type 2 diabetes may require oral medications and/or insulin, but often the disease can be controlled through weight loss, improved nutrition, and exercise. People who are overweight, physically inactive, or have a family history of the disease are at an increased risk of developing Type 2 diabetes. In recent years, there has been a substantial increase in the number of children and adolescents diagnosed with Type 2 diabetes, which is attributed to the increased prevalence of obesity among youth.

- Gestational diabetes is the term given to diabetes that develops during pregnancy. This type of diabetes occurs in about 2-5% of all pregnancies. At the end of pregnancy, blood glucose levels return to normal in about 95% of all cases. However, women who have had gestational diabetes are more likely to develop Type 2 diabetes later in life.

About the Nebraska Diabetes Prevention and Control Program

The Nebraska Diabetes Control Program (recently renamed the Nebraska Diabetes Prevention and Control Program) was established in 1977 within the Nebraska Department of Health, which is now part of the Nebraska Health and Human Services System. The goal of the program is to reduce diabetes-related disability and death in Nebraska, and to improve the quality of life and medical care for Nebraskans who have diabetes. In recent years, the program has attempted to address these goals largely through public and professional education. With the assistance of physicians and other health care providers, the program has also recently developed a set of guidelines for the clinical care of people with diabetes (known as the Nebraska Diabetes Consensus Guidelines), and is now working to encourage medical care providers throughout the state to adopt them for use in their own practices. The Nebraska Diabetes Prevention and Control Program is funded by the Centers for Disease Control and Prevention, an agency within the U.S. Department of Health and Human Services System.

About This Report

This report represents the third edition of "The Burden of Diabetes in Nebraska", and was prepared by the Nebraska Diabetes Prevention and Control Program. The two previous editions of the report were published in 1995 and 1997. The purpose of the report is to provide health care professionals, the public health community, policy-makers, and the general public with the latest data that describe the impact of diabetes in Nebraska. These data also represent a critical source of information for the Nebraska Diabetes Prevention and Control Program, which uses them to identify specific issues of concern, and to develop strategies to address them.

A detailed description of the data sources that were used to prepare this report is presented in Appendix B. An electronic version of this report is available to Internet users via the Nebraska Health and Human Services System web site: www.hhs.state.ne.us/hew/dpc/ndcp.htm.

PREVALENCE

Throughout the United States, diabetes is becoming increasingly common. According to the National Health Interview Survey, the prevalence of diabetes among all Americans increased by 19% between 1980 and 1996, while data from the Behavioral Risk Factor Surveillance System (BRFSS) show a 49% increase among U.S. adults (i.e., age 18 years and older) between 1990 and 2000. Most of these increases are attributed not to the aging of the U.S. population, but to the substantial increase in obesity that has also occurred during these years. The BRFSS data collected in 2000 estimate that 7.3% of all U.S. adults

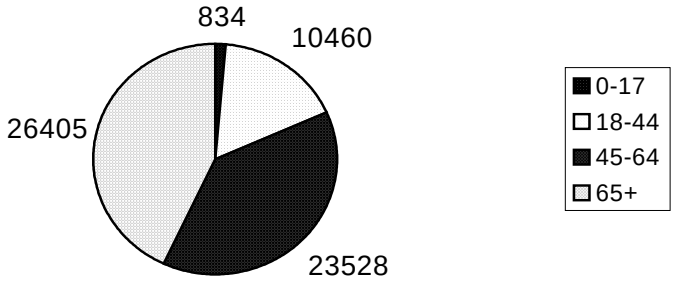
have been diagnosed with diabetes. This figure translates into a population of approximately 16 million adult Americans with diabetes.

In Nebraska, data from the 2000 BRFSS estimate that the prevalence of diagnosed diabetes among adults was 5.4%. Excluding gestational diabetes, the rate was 4.9%, and this figure translates into a statewide population of over 60,000 adults with diabetes. In addition, there were approximately 20,000 Nebraskans who had diabetes in 2000 but were not aware of it. Nebraska BRFSS data for the past decade do not show a significant increase in the percentage of adults with diagnosed diabetes (in 1990, the figure stood at 4.6%), but evidence from other data presented in this report (particularly the striking increase in the prevalence of obesity, which is a strong risk factor for diabetes, that occurred among Nebraska adults during the 1990s) suggests that the prevalence of diabetes has probably increased more than indicated by recent BRFSS findings.

In addition to the BRFSS, data concerning the prevalence of diabetes in Nebraska are also available from birth certificates, which note the presence of gestational and maternal (i.e., pre-existing) diabetes. Together, these data show that:

- People who are 65 years of age and older now comprise over 40% of all Nebraskans with diabetes *(see Figure 1)*. The increased risk of diabetes that accompanies age has serious implications for Nebraska, since most of the state's future population growth will occur among our oldest citizens. In fact, the U.S. Census Bureau predicts that Nebraska's 65-and-older population will grow by 73% between 2000 and 2025, increasing in size from about 230,000 to over 400,000. As this population grows, the number of people with diabetes will also grow.

Figure 1. Estimated number of people with diagnosed diabetes*, by age, Nebraska, 2000



*excluding gestational diabetes

Sources: Nebraska BRFSS; National Institute of Diabetes, Digestive, and Kidney Diseases

- The prevalence of diabetes increases strongly with age *(see Table 1)*. Less than 2% of people between the ages of 18 and 44 have ever been diagnosed with diabetes, but for people 65 and older, this figure increases seven-fold, to over 11%. Nebraskans who have diabetes are, on average, 50 years old when first diagnosed with the disease.

- Diabetes is slightly more common among men than women *(see Table 1)*. However, when women who have had gestational diabetes are included, prevalence is slightly higher for women.

- The prevalence of diabetes among African-Americans is more than double the rate for whites *(see Table 1)*. Nebraska-specific data are not available for other races or ethnic groups. However, data from the Indian Health Service show that the prevalence of diabetes among Native Americans 20 and older who live in the Northern Plains region (a six-state area which includes Nebraska) was 16.3% in 1997.

- The prevalence of diabetes also varies by education and income *(see Table 1)*. People who have never graduated from high school are about three times more likely to have diabetes than college graduates, while those who have a household income of less than $20,000 per year are more than twice as likely to have it as are those who have a household income of at least $35,000. However, since the elderly are more likely to have less education and lower income than young and middle-aged adults, these findings probably reflect age differences rather than the independent effect of either education or income.

- Obesity is a major risk factor for Type 2 diabetes, and the prevalence of diagnosed cases by weight confirms this. Adults who are obese are over three times more likely than those of healthy weight to have diabetes *(see Table 1)*.

Table 1. Percentage of adults with diagnosed diabetes (excluding gestational diabetes), by selected characteristics, Nebraska, 1996-2000

Characteristics	***Percent (%) with Diagnosed Diabetes***
Age	
18-44	1.5
45-64	6.3
65+	11.2
Sex	
Male	4.9
Female	4.6
Race	
White	4.6
African-American	12.2
Other	4.6
Education	
Some High School	9.1
High School Graduate	5.8
Some College	3.4
College Graduate	3.1
Annual Household Income	
Less than $20,000	7.5
$20,000 to $34,999	5.2
$35,000 or More	3.1
Weight Status	
Healthy*	2.5
Overweight†	4.8
Obese‡	9.6

*Body Mass Index (the BMI is defined as a person's weight divided by the square of their height) of 18.5 or greater and less than 25
†BMI between 25 and 29
‡BMI of 30 or greater
Source: Nebraska BRFSS

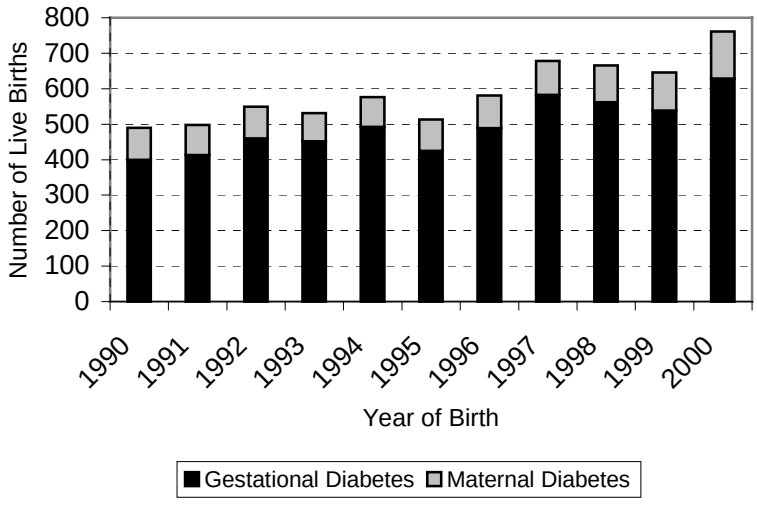
- Both the number and rate of cases of gestational diabetes have increased by over 50% in Nebraska during the past decade *(see Figure 2)*. The number of babies born to Nebraska women with gestational diabetes rose from 400 in 1990 to 629 in 2000. These figures represent 1.6% of the state's live birth total in 1990 and 2.6% in 2000. During the period 1990-2000, there were 5,443 babies born to Nebraska women with gestational diabetes.

- The prevalence of gestational diabetes varies by race, ethnicity, and age of the mother. During the years 1996-2000, gestational diabetes was far more common among Native American women (5.3%) and Latinas (4.0%) than among either whites (2.3%) or African Americans (1.5%). Prevalence also rose with the age of the mother, with rates

of 1.3% for women younger than 25 years, 2.6% for women 25 to 34, and 4.4% for women 35 and older.

- Similarly, the number and rate of cases of maternal (i.e., pre-existing) diabetes have also increased by about 50% in Nebraska during the past decade *(see Figure 2)*. The number of babies born to Nebraska women with maternal diabetes rose from 90 in 1990 to 132 in 2000. These figures represent 0.37% of the state's live birth total in 1990 and 0.54% in 2000. During the period 1990-2000, there were 1,046 babies born to Nebraska women with maternal diabetes.

Figure 2. Live births with gestational and maternal diabetes, Nebraska, 1990-2000



Source: Nebraska Health and Human Services System (Vital Statistics)

- Estimates of the number of people in 2000 who had been diagnosed with diabetes (excluding gestational diabetes) for every county in Nebraska are presented in Appendix A, Table 1. The number and percentage of live births during the years 1996-2000 in which the mother had either gestational or maternal diabetes are presented for every county in the state in Appendix A, Table 2.

RISK FACTORS

For Type 1 diabetes, there are no known modifiable risk factors that can lower a person's chances of developing the disease. For Type 2 diabetes, however, both obesity and lack of physical activity are significant risk factors, making lifestyle changes such as better nutrition, weight control, and regular physical activity highly advisable. Some estimates suggest that the risk of developing Type 2 diabetes could be reduced by up to 75% through reductions in obesity, while increased physical activity could reduce the risk by up to 50%. In fact, a recent clinical trial found that, for people at high risk for developing diabetes,

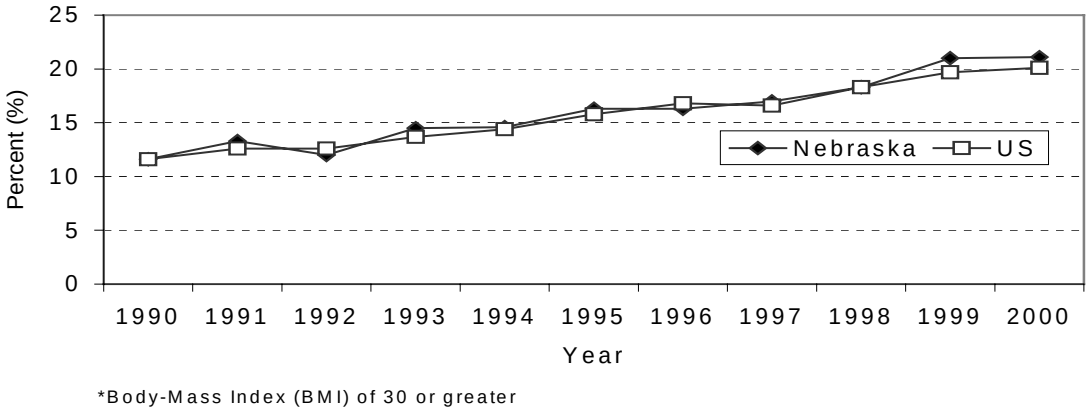
increased physical activity and improved diet that result in moderate weight loss can delay and prevent the onset of the disease. In addition, for some people who have Type 2 diabetes and are obese, diabetes symptoms will disappear completely if normal weight is restored.

People who have diabetes also suffer an increased risk of developing a number of disabling and life-threatening complications, including heart disease, stroke, kidney failure, blindness, neuropathy (inflammation and degeneration of peripheral nerves), and peripheral vascular disease, which can ultimately lead to amputation of the lower extremities. In addition to obesity and lack of physical activity, high blood pressure (also known as hypertension), cigarette smoking, and high cholesterol are known risk factors for cardiovascular disease, currently the leading cause of death in the United States. High blood pressure is also a risk factor for diabetes-related blindness, kidney disease, neuropathy, and peripheral vascular disease, and also contributes to the progress of these diseases after their onset. Cigarette smoking and high cholesterol are also risk factors for peripheral vascular disease, while smoking can hasten the decline of kidney function among people with diabetes.

Data concerning risk factor prevalence in Nebraska are collected by the Behavioral Risk Factor Surveillance System (BRFSS) and the Youth Risk Behavior Surveillance System (YRBSS). These data show that:

- The percentage of Nebraska adults who are obese has almost doubled during the past decade *(see Figure 3)*. In 2000, 21.1% of Nebraska adults--more than one in five--were obese, compared to the figure of 11.6% recorded in 1990. A virtually identical trend was observed throughout the United States during these years. A person is considered obese if their Body-Mass Index (calculated by dividing a person's weight by the squared value of their height) is 30 or greater.

Figure 3. Percentage of adults who are obese*, Nebraska and US, 1990-2000



Source: BRFSS (Nebraska and U.S.)

- More than one-third (38.2%) of Nebraska adults who have diabetes are obese, compared to 17.8% for those who do not have diabetes *(see Figure 4)*. When the data are expanded to include overweight (i.e., Body-Mass Index = 25-29, which is above normal but below the obese level) as well as obese individuals, the proportion who fit into either category increases to 76.0% for people with diabetes and to 54.7% for people without it. Regardless of age or gender, people with diabetes are more likely to be either obese or overweight than are people without diabetes.

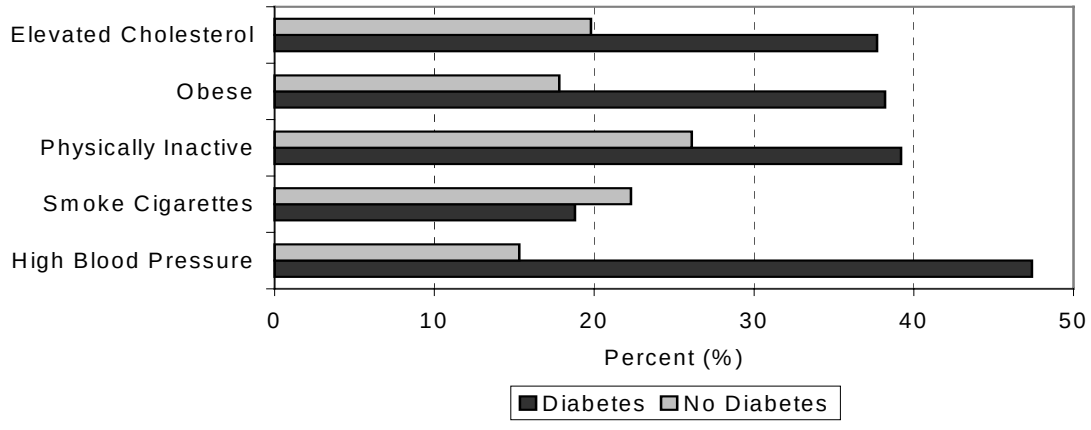
- Nearly four of every ten (39.2%) Nebraska adults who have diabetes are physically inactive; i.e., they reported that they had not participated in any leisure-time physical activities during the past month *(see Figure 4)*. Among those without diabetes, the comparable figure is 26.1%. Regardless of age or gender, people with diabetes are more likely to be physically inactive than are people without diabetes.

- Almost half (47.4%) of Nebraska adults with diabetes have been told that they have high blood pressure, compared to 15.3% for those without diabetes *(see Figure 4)*. Age is also a strong risk factor for high blood pressure, whether or not a person has diabetes, but high blood pressure is more common at every age among people with diabetes in comparison to people without diabetes.

- Over one-third (37.7%) of Nebraska adults with diabetes have been told that they have high cholesterol, compared to 19.8% for those without diabetes *(see Figure 4)*. Regardless of age or gender, people with diabetes are more likely to have high cholesterol than are those without it.

- People with diabetes are slightly less likely to smoke cigarettes than are people without diabetes, yet nearly one of every five (18.8%) Nebraska adults who have diabetes is a smoker *(see Figure 4)*.

Figure 4. Percentage of adults with selected risk factors, by diabetes status, Nebraska, 1996-2000



Source: Nebraska BRFSS

- In 2001, only about one-quarter (27.7%) of Nebraska high school students reported engaging in moderate physical activity (i.e., physical activity that lasted for at least 30 minutes and took place five or more times during the past week). In addition, more than half (56.2%) did not attend even one physical education class during the past week, and over one-quarter (26.2%) watched three or more hours of television per school day.

- Over the past several decades, there has been a sharp increase in the proportion of U.S. children who are obese, which in turn has led to a substantial increase in the number of cases of Type 2 diabetes among children and adolescents. According to the National Health and Nutrition Examination Surveys, the prevalence of obesity among children 6-11 years of age increased from 4% in the early 1970s to 13% in 1999. For children 12-19 years of age, the prevalence rate increased from 6% to 14% during the same period. In Nebraska, data collected in 2001 by the YRBSS show that approximately one in five (20.3%) high school students was either overweight or at risk for becoming overweight (n.b., YRBSS data use the terms "overweight" and "at risk for becoming overweight" in place of, and as synonyms for, the terms "obese" and "overweight", respectively).

HEALTH CARE

Proper care and management of diabetes are important for two reasons: there is at present no cure for diabetes, and many of the adverse health outcomes associated with diabetes are preventable or can be delayed or minimized with appropriate management and treatment. Most diabetes care must be individualized based on the type and severity of diabetes as well as other patient characteristics. Continuing care is crucial in the management of diabetes, and treatment must be evaluated and modified as necessary. Since the majority of diabetes care is self-care, patient education in self-management is essential. Clinical care should also include an initial evaluation, establishment of treatment goals, development of a management plan, and monitoring and treatment of cardiovascular and other complications.

To ensure quality health care for people with diabetes, the Nebraska Diabetes Prevention and Control Program has recently spearheaded the development of guidelines to help clinicians provide the most effective care for their diabetic patients. These guidelines, known as the Nebraska Diabetes Consensus Guidelines, are based largely on the recommended standards of care developed by the American Diabetes Association. The Nebraska Diabetes Consensus Guidelines are summarized in the following table.

Nebraska Diabetes Consensus Guidelines	
Type of Care	***Frequency***
Comprehensive Exam & History Update	Annually
Weight Measurement	Every visit
Blood Pressure Measurement	Every visit
Foot Exam & Pedal Pulses Check	Every visit
Skin & Injection Sites Inspection	Every visit
Blood Sugar Measurement	Every visit
Review of Self-Blood Glucose Monitoring Record	Every visit
Hemoglobin A1c Measurement	Quarterly, if treated with insulin; 2-4 times per year or as needed, if not treated with insulin
Review & Update Current Medications	Every visit
Review of Smoking Cessation	Every visit (if patient is attempting to quit smoking)
Abdominal Exam	Annually
Neurological Exam	Annually
Cardiac Assessment & Pulses Check	Annually
Thyroid Assessment	Annually, and perform thyroid function tests when indicated
Dilated Eye Exam	Annually
Lipid Profile	Annually (if results are within normal limits, the clinician may elect to do this less frequently)
Monitoring for Nephropathy	Annually (for Type 1 diabetes, begin monitoring 5 years after diagnosis and then do annually at adolescence; for Type 2 diabetes, begin annual monitoring at diagnosis)
Dental Care	Biannually
Pneumonia Vaccination	Once, and repeat after age 65 if more than 5 years since last vaccination
Influenza Vaccination	Annually
Review Self-Management Knowledge & Skills	Annually

Information concerning health insurance, utilization of health care services, and diabetes self-care are collected as part of the Behavioral Risk Factor Surveillance System. These data show that:

- Most Nebraska adults with diabetes have health insurance, and they are slightly more likely to have it than those without diabetes, by a margin of 94.1% to 91.7%. However, this finding results from the fact that a much larger portion of the diabetic population is 65 years of age and older, and is thus automatically (in nearly all cases) covered by Medicare. Restricting the analysis to people under the age of 65 lowers the rate of health insurance coverage to 89.6% for people with diabetes, which is nearly equal to the rate for the non-diabetic population (89.9%).

- Only about one-third of Nebraska adults with diabetes (37.3%) have ever had a pneumonia vaccination, compared to 17.2% for adults without diabetes *(see Figure 5)*. Among people 65 and older, however, the pneumonia vaccination rate for people

without diabetes is slightly higher than the rate for people with diabetes (52.6% vs. 50.7%).

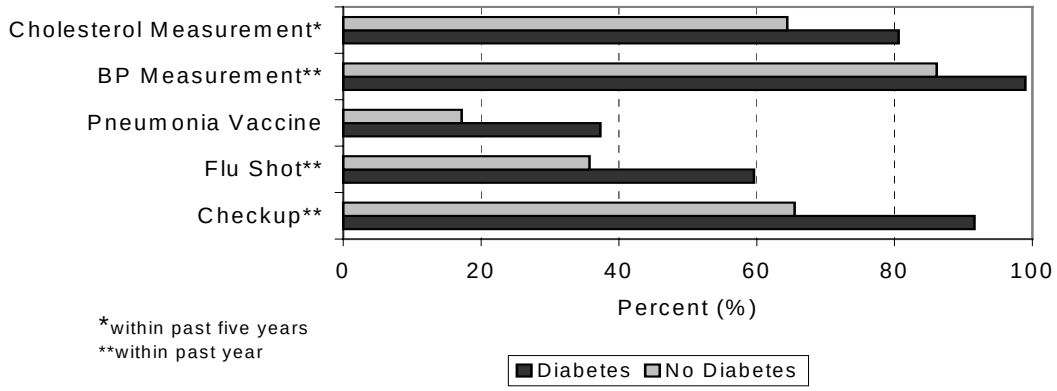
- Nearly three of every five Nebraska adults with diabetes (59.6%) have had an influenza vaccination within the past year, compared to 35.7% for adults without diabetes *(see Figure 5)*. Among people 65 and older, 71.6% of those with diabetes have had an influenza vaccination within the past year, compared to 67.0% for those without diabetes.

- Nearly all Nebraska adults with diabetes (99.0%) have had their blood pressure checked within the past year, compared to 86.1% for adults without diabetes *(see Figure 5)*.

- Most Nebraska adults with diabetes (80.6%) have had their blood cholesterol measured at least once during the past five years, compared to 64.4% for adults without diabetes *(see Figure 5)*. When limited to blood cholesterol measurements taken within the past year, these figures drop to 69.3% for those with diabetes and 44.8% for those without diabetes. However, the apparent advantage among people with diabetes is due almost entirely to the fact that people are more likely to have their cholesterol tested as they grow older, and that people with diabetes are, on average, older than people without diabetes.

- Most Nebraska adults with diabetes (91.6%) have had a check-up within the past year, compared to 65.5% for adults without diabetes *(see Figure 5)*. Like cholesterol tests, the percentage of people who have annual check-ups increases with age regardless of diabetes status, but people with diabetes are still more likely than people without diabetes to have had a check-up at any age. Most Nebraska adults with diabetes (91.4%) also visited a doctor, nurse, or other health professional at least once during the past year specifically for their diabetes, with slightly more than half (51.3%) making four or more such visits.

Figure 5. Percentage of adults who have received selected preventive health services, by diabetes status, Nebraska, 1996-2000



Source: Nebraska BRFSS

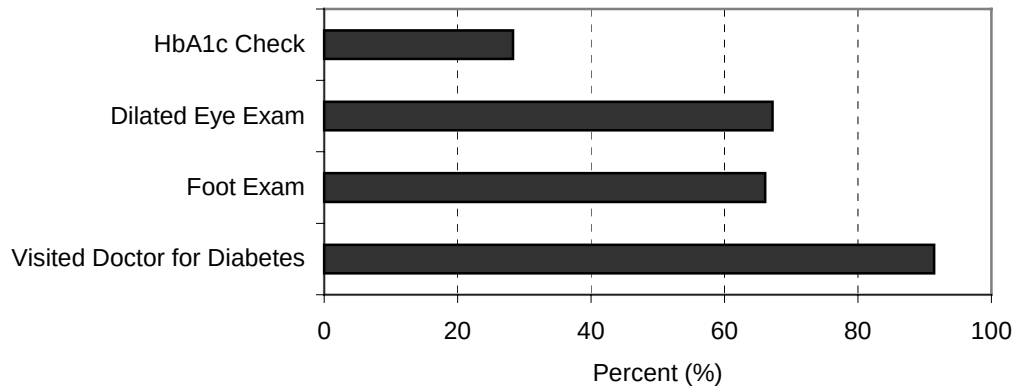
- Just over one-third (37.0%) of Nebraska adults with diabetes use insulin. Insulin use is more common at younger ages: among those 18-44 years old, 51.6% take insulin. Most of those who use insulin (78.2%) take it either once or twice per day.

- Most Nebraska adults with diabetes (83.1%) check their blood glucose themselves, or have a friend or family member check it for them. Just over half (52.3%) check it at least once per day.

- Most Nebraska adults with diabetes (91.4%) have visited a physician at least once during the past year specifically for their diabetes *(see Figure 6)*. Slightly more than half (51.3%) have visited a physician four or more times during the past year for their diabetes.

- Only about one-fourth (28.3%) of Nebraska adults with diabetes have had a glycosylated hemoglobin test (also referred to as the hemoglobin A1c test) within the past year *(see Figure 6)*. However, like all BRFSS data, this figure is based on self-reported information and may be an underestimate, since many people with diabetes are not familiar with the terms "glycosylated hemoglobin" and "hemoglobin A1c" or may have been tested by their physician and not been aware of it. In fact, according to data from the Health Plan Employer Data and Information Set (HEDIS) for the year 2000 (HEDIS data are compiled annually by U.S. health care plans to monitor the type and amount of care that they provide to their members), 75% of U.S. adults with diabetes had at least one hemoglobin A1c test during the past year.

Figure 6. Percentage of adults with diabetes who have received selected preventive health services within the past year, Nebraska, 1996-2000



Source: Nebraska BRFSS

- Nearly two-thirds of Nebraska adults with diabetes (66.1%) have had a health professional check their feet for sores and irritations at least once during the past year *(see Figure 6)*. Fewer than a third (30.0%) have had a health professional check their feet four or more times during the past year.

- Nearly two-thirds of Nebraska adults with diabetes (67.3%) have had a dilated eye examination within the past year *(see Figure 6)*. Only a small percentage (6.6%) has never had one.

COMPLICATIONS

People with diabetes can experience a number of complications, which can be classified as either acute, long-term, or pregnancy-related. The acute complications of diabetes can occur at any time and can usually be corrected, while the long-term complications may take decades to develop and are often irreversible. The long-term complications of diabetes include cardiovascular disease, microvascular disease, and neuropathy. Microvascular complications include diabetic retinopathy and kidney disease, which if untreated, can lead to blindness and kidney failure (also referred to as end-stage renal disease, or ESRD). Loss of sensation in the legs and feet due to neuropathy or impeded blood supply can result in peripheral vascular damage that can, in turn, lead to ulcers and amputations of the toes, feet, and legs. Among the acute metabolic complications of diabetes, diabetic ketoacidosis (DKA) is one of the most serious, and can be fatal. DKA is usually confined to people who have Type 1 diabetes, and is the result of insulin insufficiency. A pregnancy complicated by diabetes can have adverse health effects on both the mother and her baby.

Hospital discharge records are a key source of information about diabetic complications, since these conditions frequently require hospitalization. In fact, people with diabetes are much more likely to be hospitalized for the complications of diabetes than for diabetes itself. Moreover, a large proportion of the cost of diabetes is attributable to in-patient hospital care. All of the data presented in this section concerning cardiovascular disease, lower-extremity amputations (LEAs), and DKA come from the discharge records of Nebraska hospitals. Data concerning ESRD are available from the U.S. Renal Disease System and are compiled from the records of facilities where kidney dialysis and transplants are provided. Data concerning pregnancy-related complications are taken from birth certificates. These data show that:

- Between 1996 and 2000, there were 860,285 in-patient hospitalizations in Nebraska (involving Nebraska residents only), and 97,363 of them listed diabetes as one of the discharge diagnoses. In other words, approximately one of every nine (11.3%) hospitalizations in Nebraska during 1996-2000 involved a person with diabetes. The number of diabetes-related hospitalizations translates into a rate of 112.5 discharges per 10,000 population per year (age-adjusted to the 2000 U.S. standard population). The average length of stay per diabetes-related hospitalization was 5.2 days, compared to 4.2 days per non-diabetes-related hospitalization. The total length of stay for all diabetes-related hospitalizations was over half a million days. The average charge per

diabetes-related hospitalization was $12,522, compared to $8,983 per non-diabetes-related hospitalization. The total charge for all diabetes-related hospitalizations was over $1.2 billion.

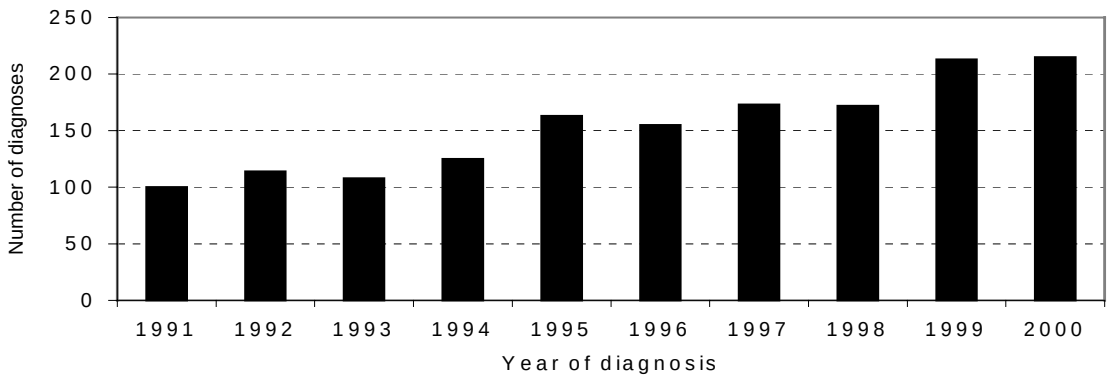
- Approximately one-third (33.2%) of all diabetes-related hospitalizations in Nebraska during 1996-2000 listed cardiovascular disease as one of the discharge diagnoses. For non-diabetes-related hospitalizations, cardiovascular disease was mentioned less than half as frequently (14.5%).

- DKA accounted for 2,252 of the diabetes-related hospitalizations that occurred in Nebraska during 1996-2000. DKA accounted for more than one of every five (21.2%) hospitalizations in which diabetes was the primary (i.e., first-listed) discharge diagnosis. Over two-thirds (68.4%) of all DKA hospitalizations involved a person under the age of 45.

- LEAs (excluding amputations resulting from trauma) were performed in 1,654 of the diabetes-related hospitalizations that occurred in Nebraska during 1996-2000. People with diabetes accounted for nearly two-thirds (62.6%) of all LEAs that were performed at Nebraska hospitals during this period. People 65 and older accounted for nearly two-thirds (62.3%) of all diabetes-related LEAs. The average charge per diabetes-related hospitalization that included an LEA was $21,358. The total charge for all diabetes-related hospitalizations that included an LEA was over $35 million.

- There were 1,538 cases of ESRD diagnosed among Nebraska residents with diabetes between 1991 and 2000 (*see Figure 7*). People with diabetes accounted for more than two of every five (42.3%) ESRD cases diagnosed in Nebraska during these years. The number of diabetes-related ESRD diagnoses in Nebraska increased from 100 in 1991 to 215 in 2000, an increase of 115%. During the same period, the number of cases diagnosed throughout the United States increased by 117%.

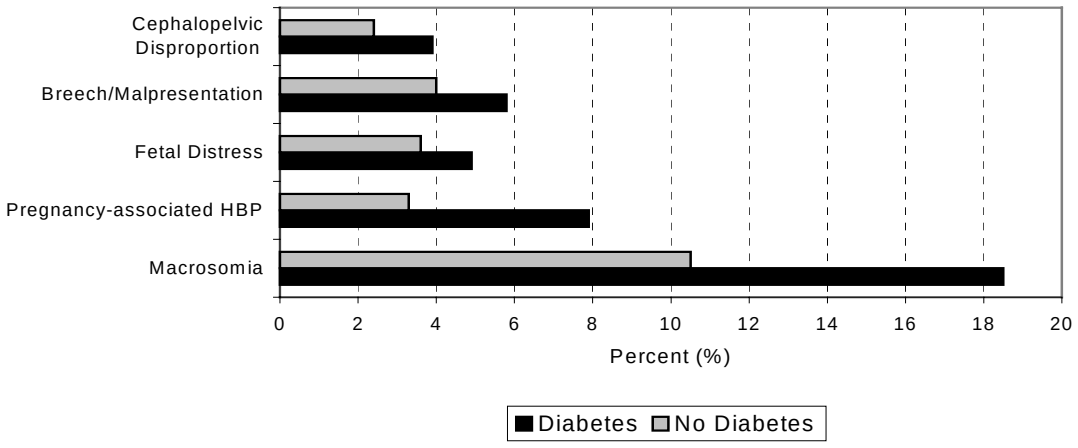
Figure 7. Diabetes-related end-stage renal disease (ESRD) diagnoses, Nebraska, 1991-2000



Source: United States Renal Data System

- There were 615 babies with macrosomia (birth weight of 4000 grams [about 10 ½ pounds] or more) born to Nebraska women with maternal or gestational diabetes during the years 1996-2000. This figure accounted for 18.5% of all Nebraska live births that were complicated by diabetes during this period. At the same time, the proportion of macrosomatic babies born to Nebraska women without diabetes was 10.5%. Macrosomatic babies are more likely to be born via Caesarian section and to experience birth trauma than are babies born to women of lower birthweights. Complications of pregnancy and delivery that occurred more often among women with diabetes in Nebraska included pregnancy-associated hypertension, fetal distress, breech/malpresentation, and cephalopelvic disproportion *(see Figure 8)*.

Figure 8. Percentage of live births with selected complications, by diabetes status of mother, Nebraska, 1996-2000



Source: Nebraska Health and Human Services System (Vital Statistics)

- The number and rate of diabetes-related hospitalizations and LEAs for the years 1996-2000 for every county in Nebraska are presented in Appendix A, Table 3.

MORTALITY

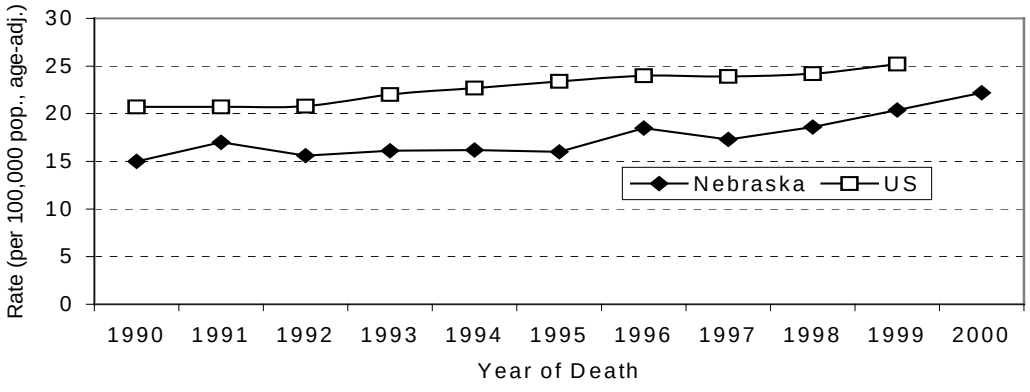
Diabetes has been ranked among the top 10 leading causes of death in the United States since 1932, and it is now the nation's seventh leading cause of death. In recent years, over 60,000 deaths per year throughout the United States have been directly attributed to diabetes, while it has contributed to an additional 130,000 deaths per year. These statistics reflect the fact that people who have diabetes are more likely to die from the complications of the disease rather than the disease itself. However, because diabetes is not mentioned at all on the death certificate of many people whose death is diabetes-related, mortality statistics alone underestimate the impact of the disease. In fact, diabetes is listed on the death certificate of only about half of all people who have diabetes at the time of their death.

Factors that increase the risk of death for people with diabetes include increasing age, age at onset of diabetes, duration of diabetes, and cardiovascular disease risk factors (smoking, hypertension, high cholesterol, physical inactivity, and obesity). However, some encouraging news has come recently from a study of mortality among people with Type 1 diabetes. The study found that people diagnosed with Type 1 diabetes between 1975 and 1979 were less than half as likely to die over the next 20 years compared to those who were diagnosed a decade earlier. The scientists who conducted the study attributed the decline in mortality risk to the introduction during the 1980s of glycosylated hemoglobin/hemoglobin A1c testing, home blood glucose monitoring and improved blood pressure therapy.

The data presented in this section are taken from Nebraska and U.S. death certificates. These data show that:

- Between 1990 and 2000, 3,415 deaths among Nebraska residents were directly attributed to diabetes (i.e., diabetes was the underlying, or primary, cause of death listed on the death certificate), making it the state's seventh leading cause of death during these years. The annual number of diabetes deaths in Nebraska increased from 252 in 1990 to 411 in 2000. These figures translate into rates of 15.0 and 22.2 deaths per 100,000 population per year, respectively (age-adjusted to the 2000 U.S. standard population), and represent a mortality rate increase of nearly 50% during this period. Nebraska's diabetes mortality rates were consistently lower than U.S. rates during these years *(see Figure 9)*.

Figure 9. Diabetes death rates*, Nebraska and US, 1990-2000



*diabetes listed on the death certificate as the underlying cause of death

Source: Nebraska Health and Human Services System (Vital Statistics)

- There were marked disparities between racial and ethnic groups in the rate of diabetes mortality in Nebraska. During the years 1990-2000, the diabetes mortality rate for the state's African-Americans (51.8 deaths per 100,000 population per year, age-adjusted to

the 2000 U.S. standard population) was over three times the rate for whites (16.6), while the rate for Native Americans (92.2) was over five times the white rate. For Hispanics, the diabetes mortality rate (26.3) was about 60% higher than the white rate. However, some of these differences in mortality may be due to a higher prevalence of diabetes within the African-American, Native American, and Hispanic populations.

- More than three-quarters (79.5%) of Nebraska's diabetes deaths for the years 1990-2000 involved a person 65 years of age or older. Diabetes deaths were more frequent among women than men (by a margin of 1,884 to 1,531), but the mortality risk, as represented by the diabetes mortality rate, was actually higher for men than for women (19.9 deaths per 100,000 population per year [age-adjusted to the 2000 U.S. standard population] vs. 16.0).

- Between 1990 and 2000, 13,267 deaths among Nebraska residents were diabetes-related; i.e., diabetes was listed on the death certificate as either the underlying or a contributing cause of death. The annual number of diabetes-related deaths in Nebraska increased from 1,022 in 1990 to 1,351 in 2000. These figures translate into rates of 60.0 and 72.3 deaths per 100,000 population per year, respectively (age-adjusted to the 2000 U.S. standard population), and represent a mortality rate increase of about 20% during this period.

- Nebraska's diabetes-related deaths bear many of the same characteristics as its diabetes deaths. About five of every six (84.9%) diabetes-related deaths that occurred between 1990 and 2000 involved a person 65 years of age or older. There were more diabetes-related deaths among women than men (6,981 vs. 6,286), but the diabetes-related mortality rate was higher for men than for women (82.0 deaths per 100,000 population per year [age-adjusted to the 2000 U.S. standard population] vs. 57.8). Diabetes-related mortality rates were also higher for African-Americans (144.7), Native Americans (266.1), and Hispanics (86.7) compared to whites (65.0).

- Nearly half (48.0%) of the diabetes-related deaths that occurred in Nebraska during 1990-2000 had cardiovascular disease (CVD) listed on the death certificate as the underlying cause of death. The number and rate of CVD deaths among people with diabetes in Nebraska was static during this period, ranging between 527 and 617 deaths per year and mortality rates of 29.8 and 34.2 (deaths per 100,000 population per year [age-adjusted to the 2000 U.S. standard population]). Conversely, the mortality rate in Nebraska for CVD without mention of diabetes on the death certificate fell by almost 18% between 1990 and 2000.

- Between 1990 and 2000, there were 110 deaths in Nebraska in which diabetic ketoacidosis (DKA) was listed on the death certificate as either the underlying cause of death or as a contributing cause of death. The annual number of DKA deaths in Nebraska during these years ranged between 7 and 17, with no discernible trend over time. DKA deaths were evenly split between men and women (55 apiece) and increased

with age, with 28 (25.5%) under the age of 45, 33 (30.0%) between 45 and 64, and 49 (44.5%) age 65 or older.

- The number and rate of diabetes and diabetes-related deaths that occurred during 1990-2000 for every county in Nebraska are presented in Appendix A, Table 4.

APPENDIX A—Diabetes Statistics, by County

Table 1. Estimated number of people with diagnosed diabetes (excluding gestational diabetes), by age and county of residence, Nebraska, 2000

COUNTY	Age (years)				TOTAL
	0-17	18-44	45-64	65+	
Adams	14	175	421	537	1147
Antelope	4	30	105	160	299
Arthur	0	2	7	8	17
Banner	0	3	14	14	31
Blaine	0	2	9	11	22
Boone	3	25	81	137	246
Box Butte	6	64	178	199	447
Boyd	1	9	36	64	110
Brown	2	14	53	86	155
Buffalo	19	272	496	530	1317
Burt	3	31	113	184	331
Butler	4	39	120	166	329
Cass	12	122	354	324	812
Cedar	5	40	118	206	369
Chase	2	17	60	92	171
Cherry	3	29	93	117	242
Cheyenne	5	47	139	183	374
Clay	3	31	101	136	271
Colfax	6	72	125	182	385
Cuming	5	48	130	222	405
Custer	5	47	170	268	490
Dakota	12	147	270	229	658
Dawes	4	58	115	150	327
Dawson	14	158	328	382	882
Deuel	1	9	32	52	94
Dixon	3	30	88	124	245
Dodge	16	189	488	685	1381
Douglas	245	3333	6611	6461	16650
Dundy	1	10	35	56	102
Fillmore	3	27	94	151	275
Franklin	1	14	51	92	158
Frontier	1	15	44	56	116
Furnas	2	21	78	137	238
Gage	10	110	321	476	917
Garden	1	9	38	60	108
Garfield	1	7	31	50	89
Gosper	1	9	34	48	92
Grant	0	3	12	11	26
Hall	27	326	735	820	1908

APPENDIX A - Diabetes Statistics By County
Table 1 (Continued)

COUNTY	Age (years)				TOTAL
	0-17	18-44	45-64	65+	
Hamilton	5	42	132	154	333
Harlan	2	14	60	93	169
Hayes	0	4	17	23	44
Hitchcock	1	12	48	75	136
Holt	5	48	159	245	457
Hooker	0	3	11	23	37
Howard	3	29	90	121	243
Jefferson	3	35	123	203	364
Johnson	2	21	66	108	197
Kearney	3	33	95	124	255
Keith	4	39	138	179	360
Keya Paha	0	4	15	22	41
Kimball	2	17	64	93	176
Knox	4	40	142	241	427
Lancaster	110	1786	3236	2942	8074
Lincoln	16	176	514	587	1293
Logan	0	3	13	14	30
Loup	0	3	12	15	30
McPherson	0	2	7	10	19
Madison	17	211	442	555	1225
Merrick	4	35	119	154	312
Morrill	3	26	82	104	215
Nance	2	17	54	86	159
Nemaha	3	38	106	151	298
Nuckolls	2	20	75	132	229
Otoe	7	71	215	305	598
Pawnee	1	11	45	90	147
Perkins	1	13	48	66	128
Phelps	5	43	140	190	378
Pierce	4	36	99	145	284
Platte	16	169	420	471	1076
Polk	2	24	79	130	235
Red Willow	5	54	158	236	453
Richardson	4	41	137	225	407
Rock	1	7	26	42	76
Saline	6	79	175	257	517
Sarpy	69	829	1570	935	3403
Saunders	10	93	276	328	707
Scotts Bluff	18	204	550	733	1505
Seward	7	89	213	269	578
Sheridan	3	30	94	152	279
Sherman	1	13	49	83	146

Appendix A - Diabetes Statistics By County
Table 1 (continued)

COUNTY	Age (years)				TOTAL
	0-17	18-44	45-64	65+	
Sioux	1	7	25	27	60
Stanton	3	32	86	94	215
Thayer	3	23	89	159	274
Thomas	0	3	12	16	31
Thurston	7	57	107	141	312
Valley	2	18	67	119	206
Washington	9	94	275	262	640
Wayne	4	66	108	146	324
Webster	2	16	61	107	184
Wheeler	0	3	14	16	33
York	6	73	205	274	558
TOTAL	834	10460	23528	26405	61227

Sources: Nebraska Behavioral Risk Factor Surveillance System (adult diabetes prevalence); National Institute of Diabetes, Digestive, and Kidney Diseases (childhood diabetes prevalence); U.S. Census (population counts)

APPENDIX A - Diabetes Statistics by County (continued)

Table 2. Number and percentage of live births to women with diabetes (gestational or maternal), by county, Nebraska, 1990-2000

COUNTY	Number of live births to women with diabetes	Total number of live births	Percentage (%) of live births to women with diabetes
Adams	129	4540	2.84
Antelope	15	998	1.50
Arthur	0	55	0.00
Banner	1	67	1.49
Blaine	3	102	2.94
Boone	34	841	4.04
Box Butte	52	1898	2.74
Boyd	7	315	2.22
Brown	11	484	2.27
Buffalo	181	6116	2.96
Burt	20	902	2.22
Butler	24	1176	2.04
Cass	96	3502	2.74
Cedar	22	1412	1.56
Chase	5	541	0.92
Cherry	5	877	0.57
Cheyenne	21	1342	1.56
Clay	37	947	3.91
Colfax	54	1615	3.34
Cuming	41	1464	2.80
Custer	38	1585	2.40
Dakota	141	3755	3.75
Dawes	11	1153	0.95
Dawson	153	4305	3.55
Deuel	5	206	2.43
Dixon	26	862	3.02
Dodge	121	4803	2.52
Douglas	1832	78123	2.35
Dundy	4	277	1.44
Fillmore	35	869	4.03
Franklin	8	429	1.86
Frontier	5	366	1.37
Furnas	20	662	3.02
Gage	93	2861	3.25
Garden	1	215	0.47
Garfield	10	229	4.37
Gosper	5	261	1.92
Grant	1	116	0.86
Greeley	15	394	3.81

APPENDIX A - Diabetes Statistics by County
Table 2 (continued)

COUNTY	Number of live births to women with diabetes	Total number of live births	Percentage (%) of live births to women with diabetes
Hall	250	9211	2.71
Hamilton	58	1271	4.56
Harlan	8	430	1.86
Hayes	2	111	1.80
Hitchcock	8	362	2.21
Holt	16	1652	0.97
Hooker	2	81	2.47
Howard	22	852	2.58
Jefferson	21	958	2.19
Johnson	13	524	2.48
Kearney	29	930	3.12
Keith	18	1054	1.71
Keya Paha	7	132	5.30
Kimball	6	465	1.29
Knox	25	1218	2.05
Lancaster	793	36166	2.19
Lincoln	107	4918	2.18
Logan	6	92	6.52
Loup	1	68	1.47
McPherson	0	53	0.00
Madison	168	6006	2.80
Merrick	46	1148	4.01
Morrill	14	740	1.89
Nance	34	551	6.17
Nemaha	18	851	2.12
Nuckolls	14	553	2.53
Otoe	37	1934	1.91
Pawnee	6	324	1.85
Perkins	7	333	2.10
Phelps	33	1393	2.37
Pierce	27	1051	2.57
Platte	201	5072	3.96
Polk	26	721	3.61
Red Willow	32	1618	1.98
Richardson	29	1179	2.46
Rock	4	189	2.12
Saline	35	1647	2.13
Sarpy	541	21553	2.51
Saunders	70	2657	2.63
Scotts Bluff	87	5820	1.49
Seward	57	1956	2.91
Sheridan	12	828	1.45

APPENDIX A - Diabetes Statistics by County
Table 2 (continued)

COUNTY	Number of live births to women with diabetes	Total number of live births	Percentage (%) of live births to women with diabetes
Sherman	10	430	2.33
Sioux	1	123	0.81
Stanton	21	895	2.35
Thayer	14	708	1.98
Thomas	1	91	1.10
Thurston	95	1670	5.69
Valley	17	562	3.02
Washington	62	2219	2.79
Wayne	27	1217	2.22
Webster	19	490	3.88
Wheeler	1	146	0.68
York	51	1966	2.59
TOTAL	6489	259854	2.50

Source: Nebraska Health and Human Services System (Vital Statistics)

APPENDIX A - Diabetes Statistics by County (continued)

Table 3. Number and rate of diabetes-related hospitalizations and lower-extremity amputations, by county, Nebraska, 1996-2000

COUNTY	Diabetes-related hospitalizations		Diabetes-related lower-extremity amputations	
	Number	Rate*	Number	Rate*
Adams	2125	122.4	37	2.1
Antelope	729	144.7	8	1.8
Arthur	13	44.5	0	0.0
Banner	15	30.1	0	0.0
Blaine	36	114.2	0	0.0
Boone	437	96.4	9	2.1
Box Butte	762	118.1	9	1.5
Boyd	215	108.4	2	0.9
Brown	228	85.7	3	1.4
Buffalo	1961	109.0	42	2.4
Burt	523	90.0	8	1.6
Butler	549	91.7	15	2.5
Cass	1258	105.2	22	1.8
Cedar	343	47.4	3	0.5
Chase	314	109.0	5	1.8
Cherry	348	87.1	5	1.2
Cheyenne	634	102.3	7	1.1
Clay	505	113.4	5	1.2
Colfax	651	80.0	15	1.6
Cuming	502	68.2	6	0.9
Custer	1433	169.6	22	2.8
Dakota	155	18.7	0	0.0
Dawes	271	54.0	8	1.9
Dawson	1645	125.8	24	1.9
Deuel	90	59.5	0	0.0
Dixon	154	36.7	1	0.3
Dodge	2397	109.8	32	1.4
Douglas	26356	131.1	476	2.4
Dundy	127	73.5	0	0.0
Fillmore	474	98.9	10	2.5
Franklin	344	112.0	6	2.0
Frontier	174	96.5	2	1.1
Furnas	511	118.5	4	0.8
Gage	1389	92.0	26	1.7
Garden	159	90.5	5	2.8
Garfield	206	119.4	0	0.0
Gosper	207	121.5	3	1.6
Grant	16	44.6	0	0.0
Greeley	251	110.9	2	0.8

APPENDIX A - Diabetes Statistics by County
Table 3 (continued)

COUNTY	Diabetes-related hospitalizations		Diabetes-related lower-extremity amputations	
	Number	Rate*	Number	Rate*
Hall	3643	133.8	53	2.0
Hamilton	554	99.0	6	1.1
Hayes	27	43.6	0	0.0
Hitchcock	234	99.4	1	0.4
Holt	1070	135.7	10	1.2
Hooker	36	73.7	0	0.0
Howard	462	107.3	2	0.3
Jefferson	592	92.9	19	3.0
Johnson	315	92.5	2	0.7
Kearney	409	102.0	10	2.5
Keith	408	74.2	7	1.1
Keya Paha	51	77.8	1	2.0
Kimball	158	56.5	3	0.9
Knox	526	67.9	17	2.4
Lancaster	10995	106.8	211	2.1
Lincoln	2519	137.2	29	1.5
Logan	97	201.3	0	0.0
Loup	40	87.1	0	0.0
McPherson	13	30.6	0	0.0
Madison	2227	121.5	33	1.7
Merrick	577	111.0	17	3.3
Morrill	330	100.8	5	1.3
Nance	323	120.7	4	1.3
Nemaha	475	94.2	20	3.9
Nuckolls	685	160.0	9	2.5
Otoe	965	97.0	18	1.7
Pawnee	345	189.3	5	1.4
Perkins	242	115.8	2	0.6
Phelps	797	127.7	6	0.9
Pierce	706	138.0	13	2.5
Platte	1672	127.3	36	2.8
Polk	382	92.4	0	0.0
Red Willow	985	134.6	14	1.9
Richardson	1081	162.3	11	1.7
Rock	150	116.9	0	0.0
Saline	853	101.6	32	3.7
Sarpy	3905	101.9	85	2.3
Saunders	1145	102.4	19	1.6
Scotts Bluff	2518	119.5	31	1.6
Seward	781	85.8	29	3.1
Sheridan	422	95.3	5	1.0

APPENDIX A - Diabetes Statistics By County
Table 3 (continued)

COUNTY	Diabetes-related hospitalizations		Diabetes-related lower-extremity amputations	
	Number	Rate*	Number	Rate*
Sherman	290	111.3	7	2.8
Sioux	12	12.7	0	0.0
Stanton	233	80.2	1	0.3
Thayer	525	100.5	5	0.9
Thurston	331	95.6	4	1.2
Valley	482	127.4	4	1.5
Washington	975	100.9	13	1.3
Wayne	334	65.3	5	1.0
Webster	493	143.9	4	1.3
Wheeler	51	103.3	1	2.9
York	782	88.5	19	2.1
Unknown	116	---	0	---
TOTAL	97363	112.5	1654	1.9

*rates are expressed per 10,000 population, and are age-adjusted to the 2000 U.S. standard population

Source: Nebraska Association of Hospitals and Health Systems

APPENDIX A - Diabetes Statistics By County (continued)

Table 4. Number and rate of diabetes deaths and diabetes-related deaths, by county, Nebraska, 1990-2000

COUNTY	Diabetes deaths		Diabetes-related deaths	
	Number	Rate*	Number	Rate*
Adams	54	1.3	272	6.4
Antelope	37	3.0	98	7.8
Arthur	0	0.0	1	1.6
Banner	1	0.9	6	5.1
Blaine	1	1.6	2	2.5
Boone	11	1.1	82	7.2
Box Butte	15	0.9	109	6.7
Boyd	6	1.1	24	3.9
Brown	9	1.4	48	7.1
Buffalo	50	1.2	282	6.7
Burt	26	2.1	83	6.0
Butler	32	2.0	139	9.0
Cass	42	1.7	190	7.5
Cedar	33	2.0	104	6.1
Chase	12	1.7	46	6.5
Cherry	16	1.6	62	6.2
Cheyenne	42	2.7	120	7.7
Clay	17	1.3	76	6.1
Colfax	25	1.3	83	4.4
Cuming	23	1.2	80	4.4
Custer	35	1.6	144	6.2
Dakota	39	2.2	146	8.2
Dawes	15	1.3	87	7.3
Dawson	60	2.0	228	7.6
Deuel	9	2.1	25	6.0
Dixon	6	0.7	68	6.2
Dodge	58	1.1	290	5.5
Douglas	806	1.9	2986	7.1
Dundy	7	1.6	32	6.5
Fillmore	23	1.7	106	8.5
Franklin	15	1.7	66	8.4
Frontier	12	2.5	31	6.5
Furnas	16	1.3	112	8.7
Gage	90	2.3	299	7.6
Garden	2	0.6	17	3.8
Garfield	3	1.1	28	6.1
Gosper	9	2.7	18	5.0
Grant	3	2.8	5	5.3
Greeley	6	1.0	26	5.1
Hall	101	1.7	391	6.4

APPENDIX A - Diabetes Statistics By County
Table 4 (continued)

COUNTY	Diabetes deaths		Diabetes-related deaths	
	Number	Rate*	Number	Rate*
Hamilton	24	1.8	86	6.5
Harlan	13	1.8	41	5.6
Hayes	3	2.0	5	3.1
Holt	20	1.0	73	3.7
Hooker	3	1.2	9	4.2
Howard	13	1.3	44	4.4
Jefferson	21	1.3	114	6.9
Johnson	12	1.4	50	5.4
Kearney	20	2.0	72	7.5
Keith	15	1.2	88	6.9
Keya Paha	1	0.9	14	8.5
Kimball	13	2.2	32	4.9
Knox	20	1.2	150	7.6
Lancaster	401	1.9	1542	7.2
Lincoln	94	2.2	281	6.6
Logan	5	4.5	10	9.1
Loup	1	0.8	5	4.1
McPherson	0	0.0	3	3.1
Madison	82	2.0	243	5.6
Merrick	13	1.1	56	4.3
Morrill	14	1.7	62	7.2
Nance	4	0.8	44	6.5
Nemaha	31	2.6	70	5.6
Nuckolls	14	1.1	98	8.4
Otoe	35	1.4	130	5.1
Pawnee	14	1.8	69	9.1
Perkins	4	0.8	21	3.8
Phelps	36	2.4	100	6.4
Pierce	12	1.0	72	5.7
Platte	48	1.6	216	7.0
Polk	11	1.2	77	7.1
Red Willow	45	2.6	92	5.4
Richardson	33	1.9	121	6.7
Rock	8	2.2	19	5.5
Saline	41	1.8	136	5.9
Sarpy	106	1.7	382	6.4
Saunders	46	1.8	168	6.4
Scotts Bluff	126	2.6	459	9.3
Seward	40	1.8	111	5.1
Sheridan	14	1.3	71	5.9
Sherman	5	0.8	31	4.7
Sioux	1	0.5	4	1.9

APPENDIX A - Diabetes Statistics by County
Table 4 (continued)

COUNTY	Diabetes deaths		Diabetes-related deaths	
	Number	Rate*	Number	Rate*
Stanton	8	1.2	37	5.7
Thayer	11	0.8	67	4.7
Thomas	0	0.0	7	8.8
Thurston	42	5.5	118	15.4
Washington	38	1.8	165	7.6
Wayne	12	1.0	65	5.5
Webster	10	1.4	78	8.7
Wheeler	4	3.1	9	8.0
York	30	1.4	149	7.0
TOTAL	3415	1.8	13267	6.7

*rates are expressed per 100,000 population, and are age-adjusted to the 2000 U.S. standard population

Source: Nebraska Health and Human Services System (Vital Statistics)

APPENDIX B—Sources of Data Used in this Report

Behavioral Risk Factor Surveillance System

The data on diabetes and risk factor prevalence that are presented in this report were collected as part of the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is a random digit-dialed telephone survey of a sample of non-institutionalized adults (age 18 years and older) conducted annually in all 50 states, the District of Columbia, Puerto Rico, Guam, and the U.S. Virgin Islands, in collaboration with the Centers for Disease Control and Prevention (CDC). In Nebraska, the BRFSS survey is conducted by the Nebraska Health and Human Services System, and now interviews over 3000 adults per year. The BRFSS survey includes questions on a wide variety of health-related topics, including diabetes, tobacco and alcohol use, physical activity, diet, weight control, health insurance, and the use of preventive and other health care services. For this report, a person was assumed to have diabetes if they answered "yes" to the question: "Have you ever been told by a doctor that you have diabetes?" Responses to this question were used to develop the state and county-specific estimates of the prevalence of diabetes presented elsewhere in this report. Responses of "don't know", "not sure" or refusals were excluded from the analysis of all BRFSS questions included in this report.

Death Certificates

The diabetes mortality data presented in this report were obtained from death certificates on file with the Nebraska Health and Human Services System. Mortality data are available for every deceased Nebraska resident, whether death occurs in Nebraska or out of state. Information collected on the death certificate include personal identifiers, demographics (age at death, gender, race), date and place of death, and the underlying (i.e., primary) and contributing causes of death. For deaths occurring in or before 1998, causes of death are coded according to the Ninth Edition of the World Health Organization's International Classification of Disease (ICD-9). For deaths occurring in 1999 or later, causes of death are coded according to the Tenth Edition of the World Health Organization's International Classification of Disease (ICD-10).

Birth Certificates

The data pertaining to diabetes and pregnancy were obtained from birth certificates on file with the Nebraska Health and Human Services System. Natality data are available for every Nebraska newborn, whether birth occurs in Nebraska or out of state. Information collected on the birth certificate include personal and parental identifiers, date and place of birth, maternal medical risk factors (including diabetes), obstetric procedures, events and method of delivery, condition of the newborn, and congenital anomalies of the child.

Hospital Discharges

The data presented in this report that pertain to diabetes-related hospitalizations were obtained from the statewide hospital discharge database maintained by the Nebraska Association of Hospitals and Health Systems (NAHHS). NAHHS compiles information from UB-92 claims forms submitted by hospitals throughout the state. Information collected on each discharge include patient demographics (age, gender, place of residence), date of discharge, length of stay, primary and secondary diagnoses, procedure(s) performed, primary source of payment, and cost of hospital stay. However, this database is limited to in-patient hospitalizations only, and does not include information on discharges from federally-operated hospitals in Nebraska or from out-of-state hospitals where Nebraskans receive care.

End-Stage Renal Disease Network

The data in this report that describe end-stage renal disease (ESRD) were obtained from the United States Renal Data System (USRDS). Funded by the National Institute of Diabetes, Digestive, and Kidney Diseases in conjunction with the Centers for Medicare and Medicaid Services (part of the U.S. Department of Health and Human Services), the USRDS is a national data system which collects, analyzes, and distributes information about ESRD in the United States. The USRDS data presented in this report were originally gathered by ESRD Network #12, which is one of the nation's 18 ESRD Network Organizations established by the U.S. Social Security Administration to monitor the quality of care given to ESRD patients by providers of dialysis services and transplantation. Information collected by the ESRD Network Organizations include personal identifiers, patient demographics, primary cause of renal failure, treatment history, Medicare payments, and transplant data.

Youth Risk Behavior Surveillance System

The data on risk factor prevalence among youth that are presented in this report were collected as part of the Youth Risk Behavior Surveillance System (YBRSS). The YRBSS is a self-administered, 87-question survey of high school students (grades 9-12) drawn from a randomly-selected sample of public school districts. The survey is conducted every other year in most states and some local public school systems in collaboration with the Centers for Disease Control and Prevention. In Nebraska, the YRBSS survey is conducted by the Nebraska Department of Education, and surveyed over 2000 students in 2001. Nebraska's 2001 survey findings are somewhat limited in that urban students are under-represented in the survey sample. The YRBSS survey includes questions on tobacco use, alcohol and other drug use, physical activity, diet, sexual behavior, and behaviors that contribute to unintentional and intentional injuries.

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